

Example User/Website Interaction Data  
(sorted by user and browsing session)

User	Browsing Session	Interaction Element Identifier
1	1	I-103
1	1	I-104
1	3	I-101
1	3	I-102
1	3	I-102
2	4	I-101
2	4	I-102
2	4	I-102
3	5	I-103
3	5	I-104
3	7	I-102
3	7	I-104
3	7	I-103
4	6	I-101
4	6	I-104
4	6	I-102
4	6	I-103
4	6	I-102
4	6	I-105
5	2	I-101
5	2	I-102
5	2	I-103
5	2	I-104
5	2	I-106
5	2	I-107
5	2	I-149
5	2	I-150

Example Interaction Element Session Frequency

Interaction Element Identifier	Sessions With Interaction
I-102	5
I-103	5
I-104	5
I-101	4
I-105	1
I-106	1
I-107	1
⋮	⋮
I-149	1
I-150	1

*Figure 1B*

*Figure 1C*

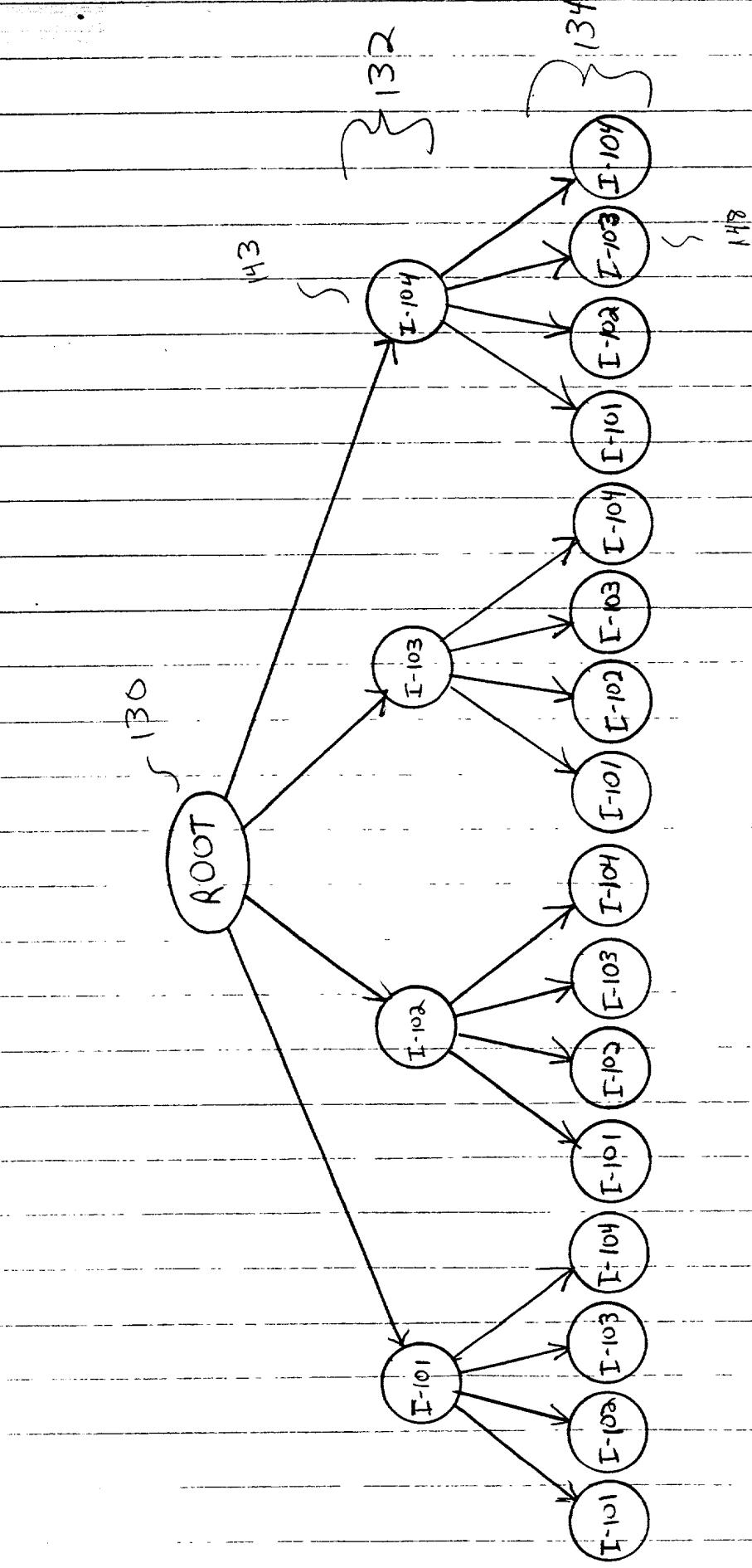


Fig. 1D

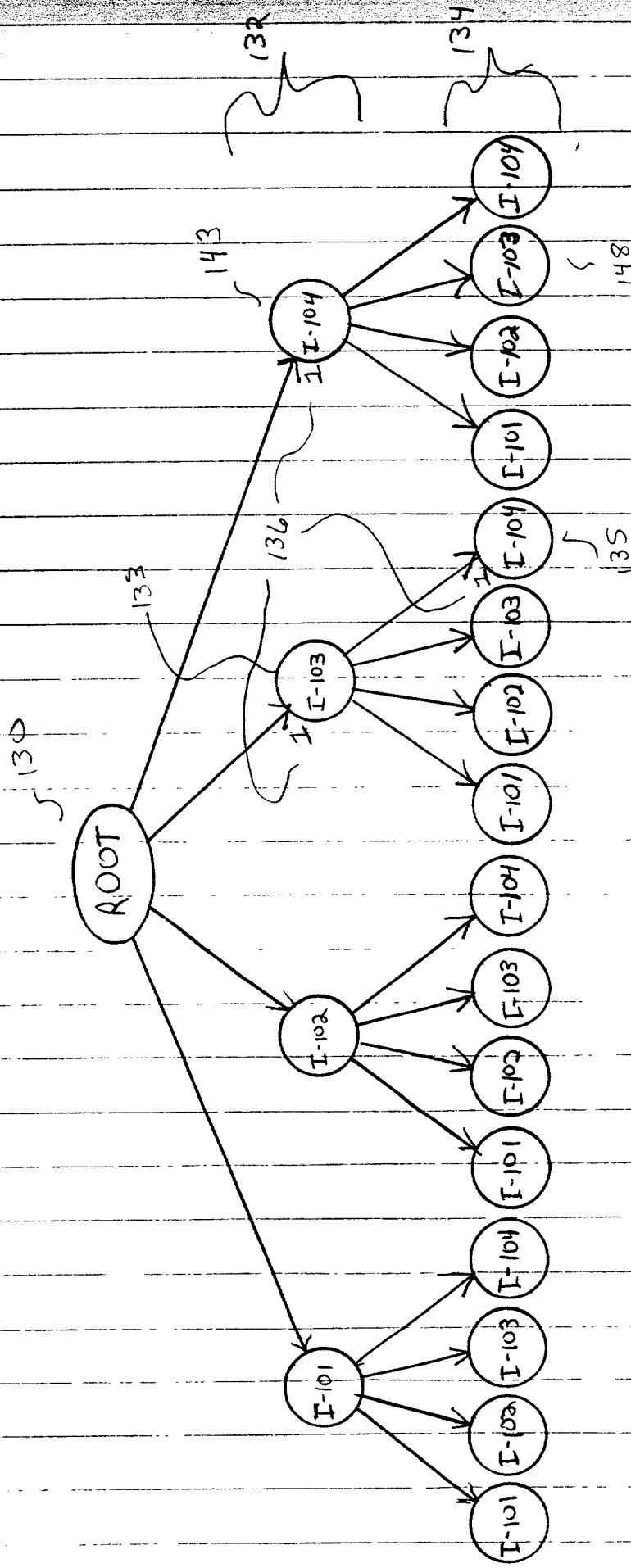


Fig. 1E

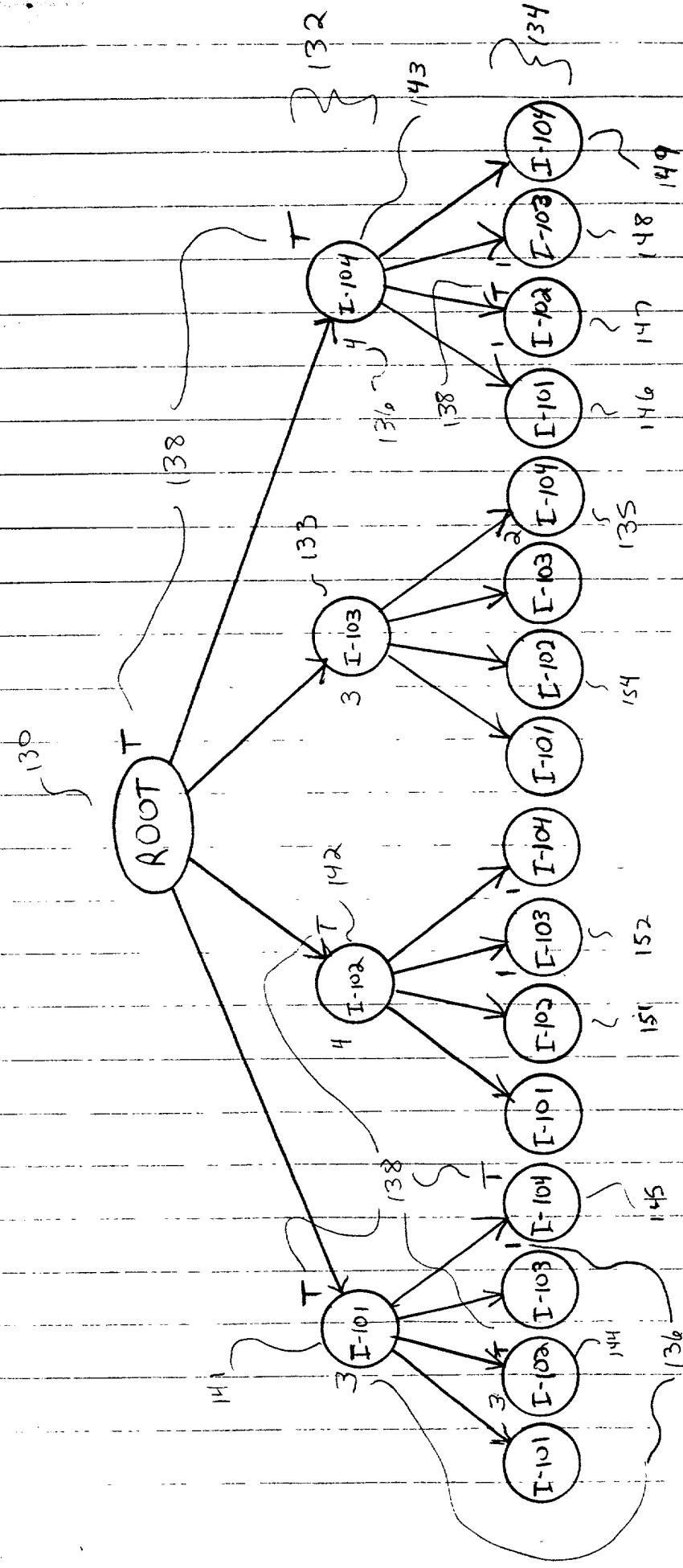


Fig. 1 F

Root	130	
I-101	141	
I-102	142	
I-104	143	
I-102	144	
I-104	145	
I-102	147	

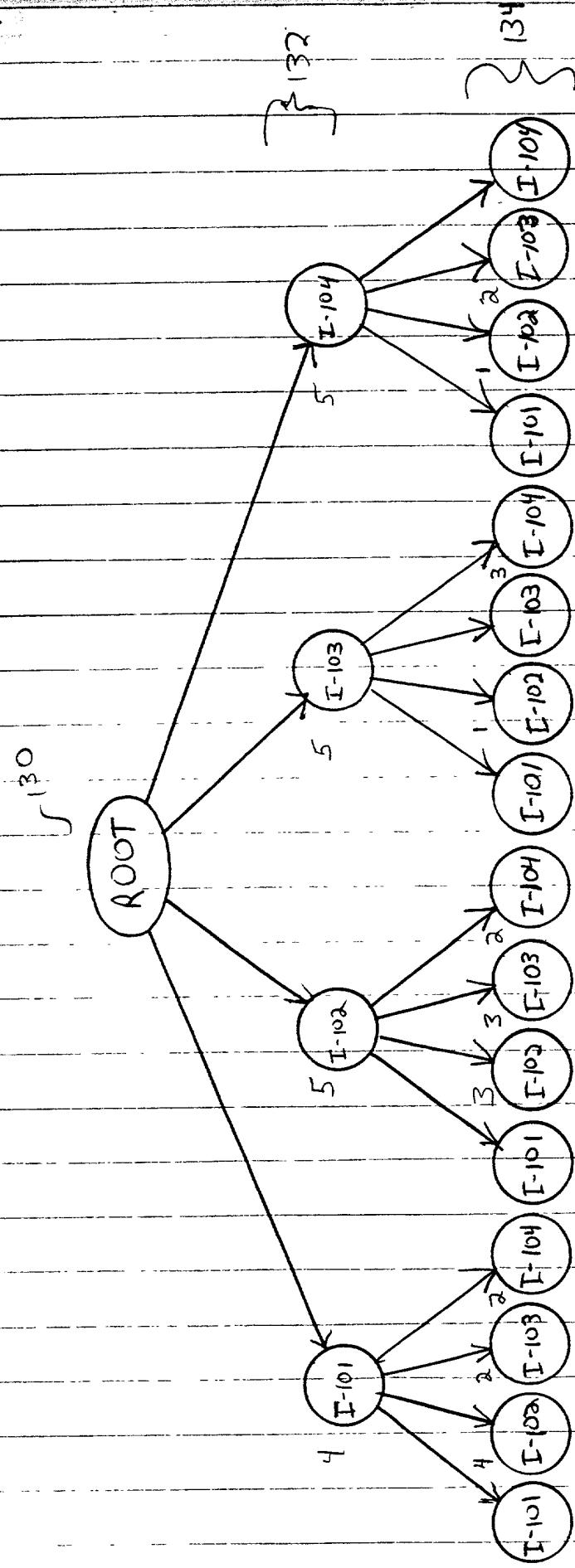


Fig 1G

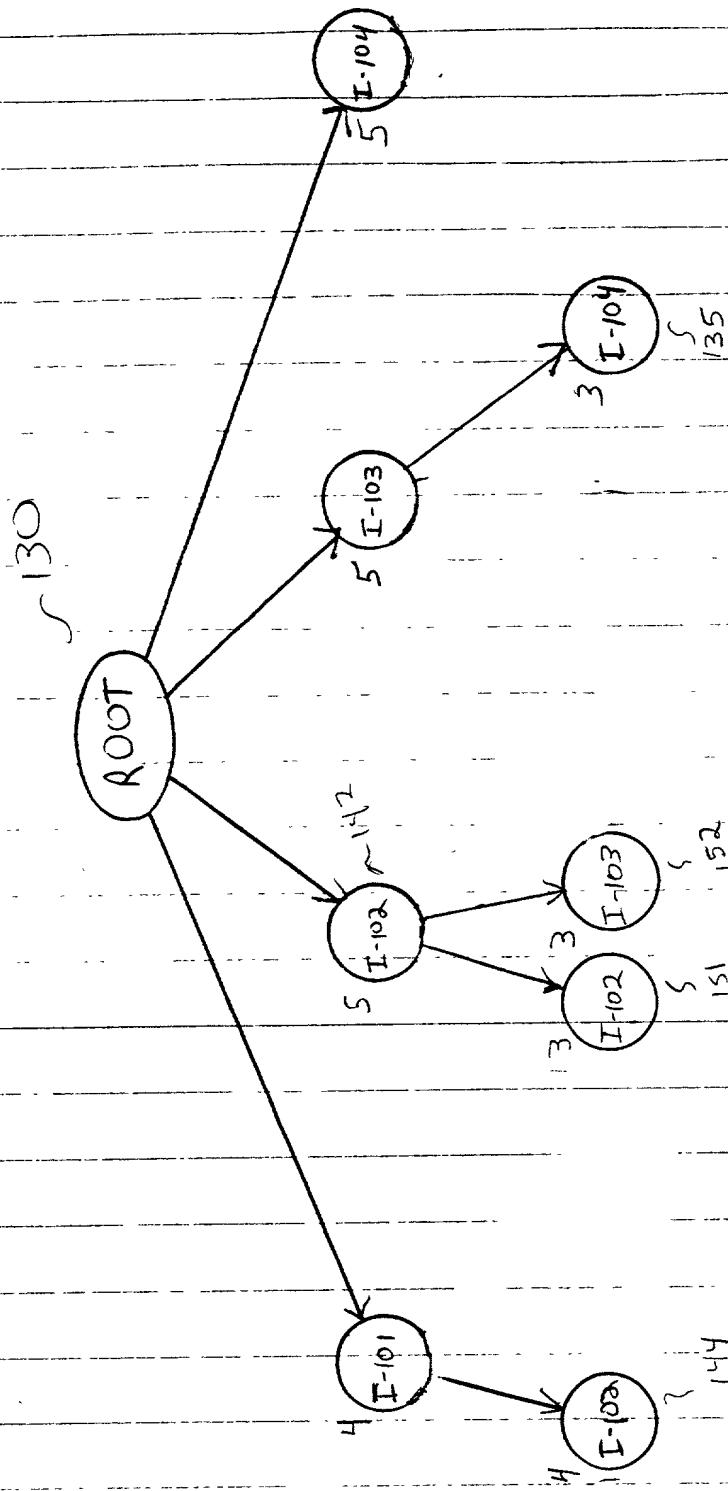


Fig. 1 H

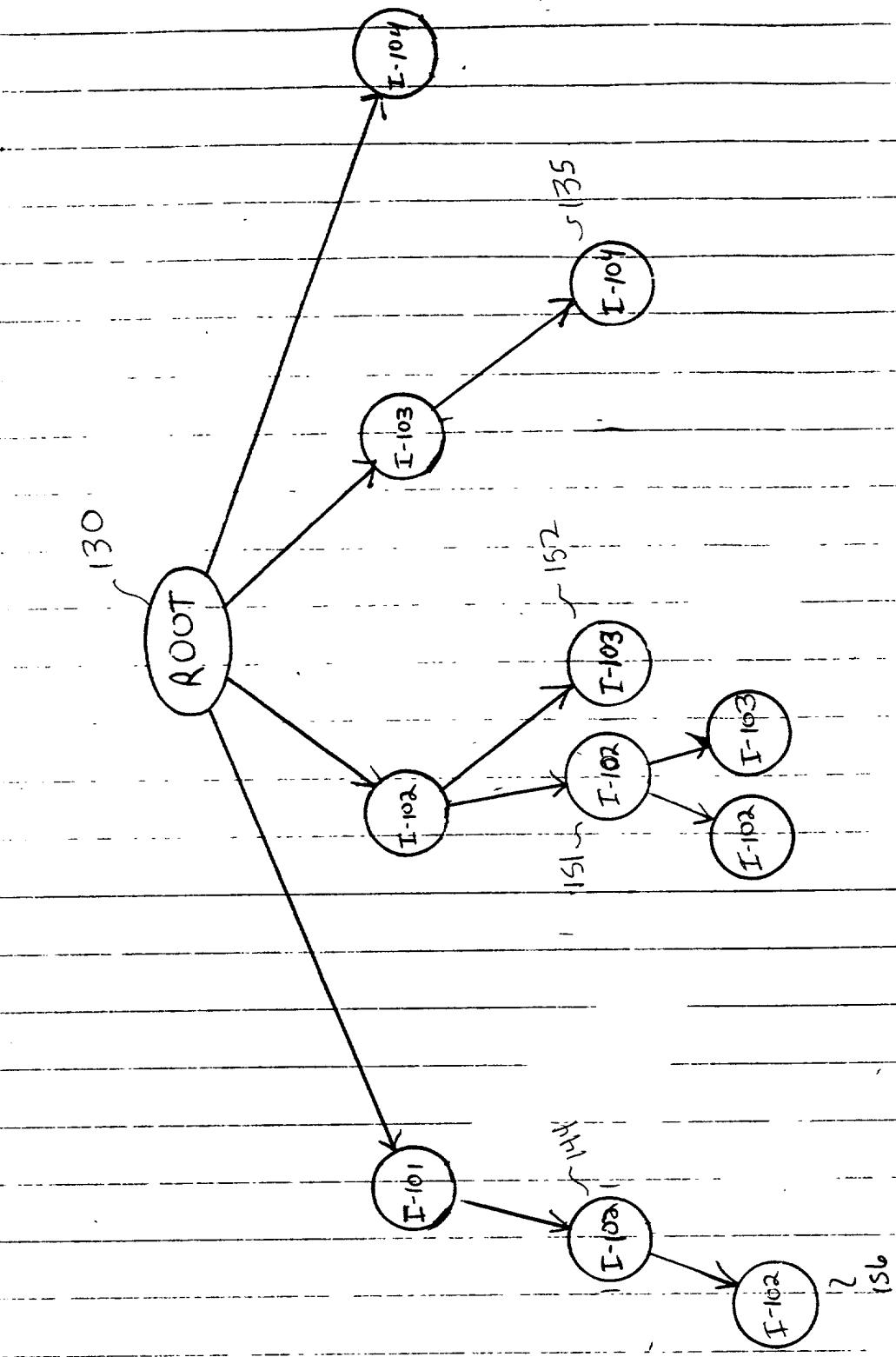


Fig. 1.1

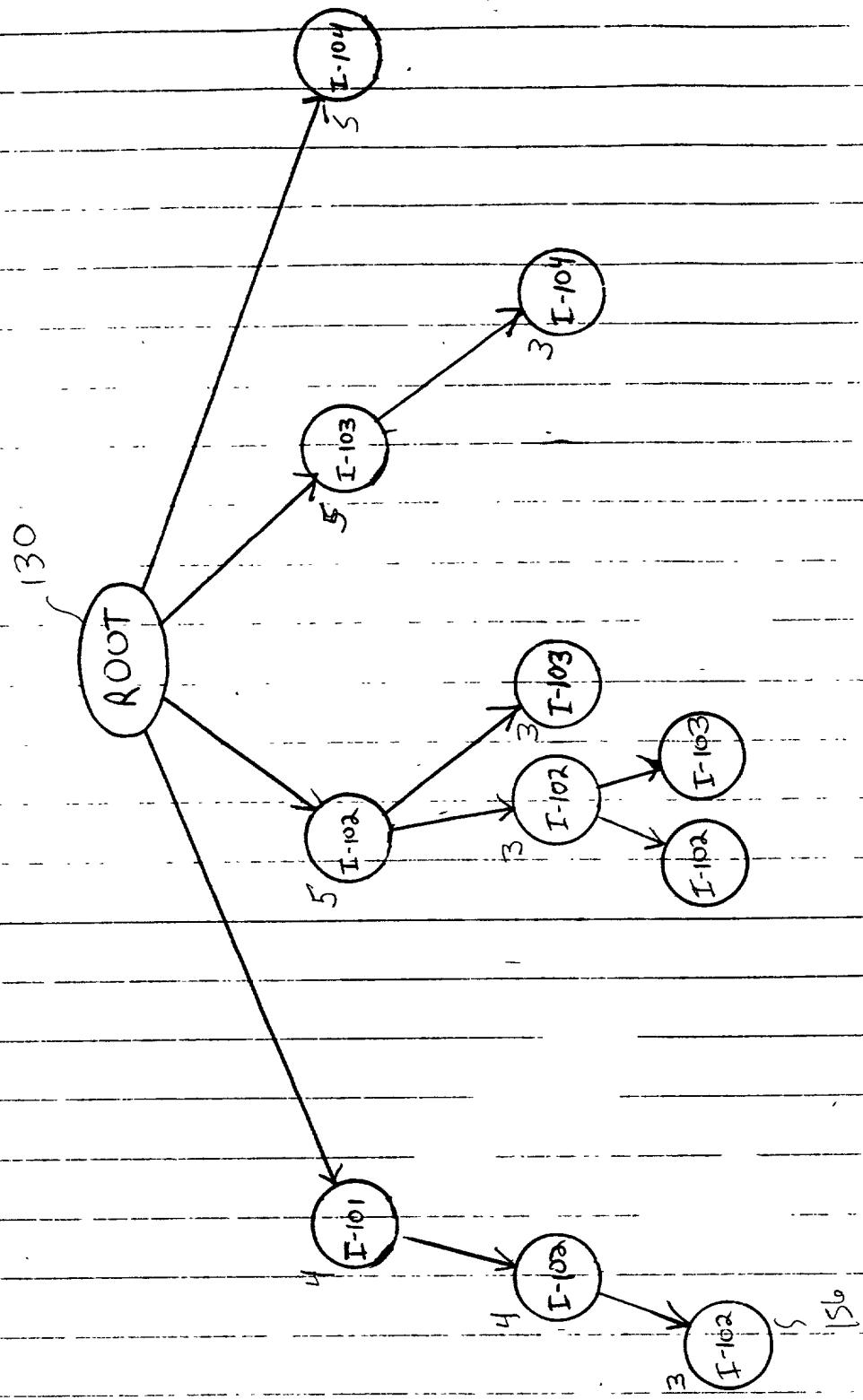


Fig. 1. J

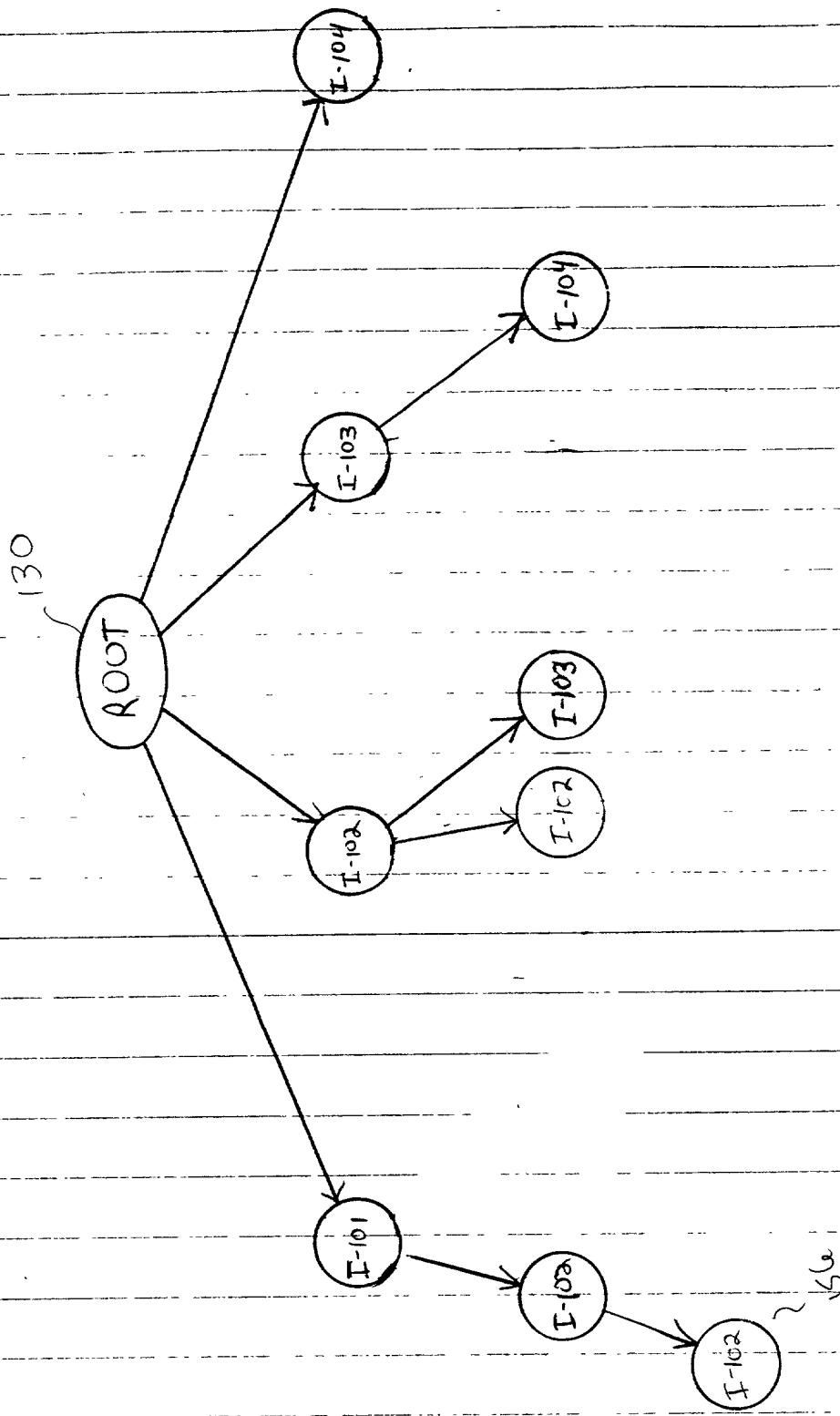


Fig. 1.K

56

Fig. 11

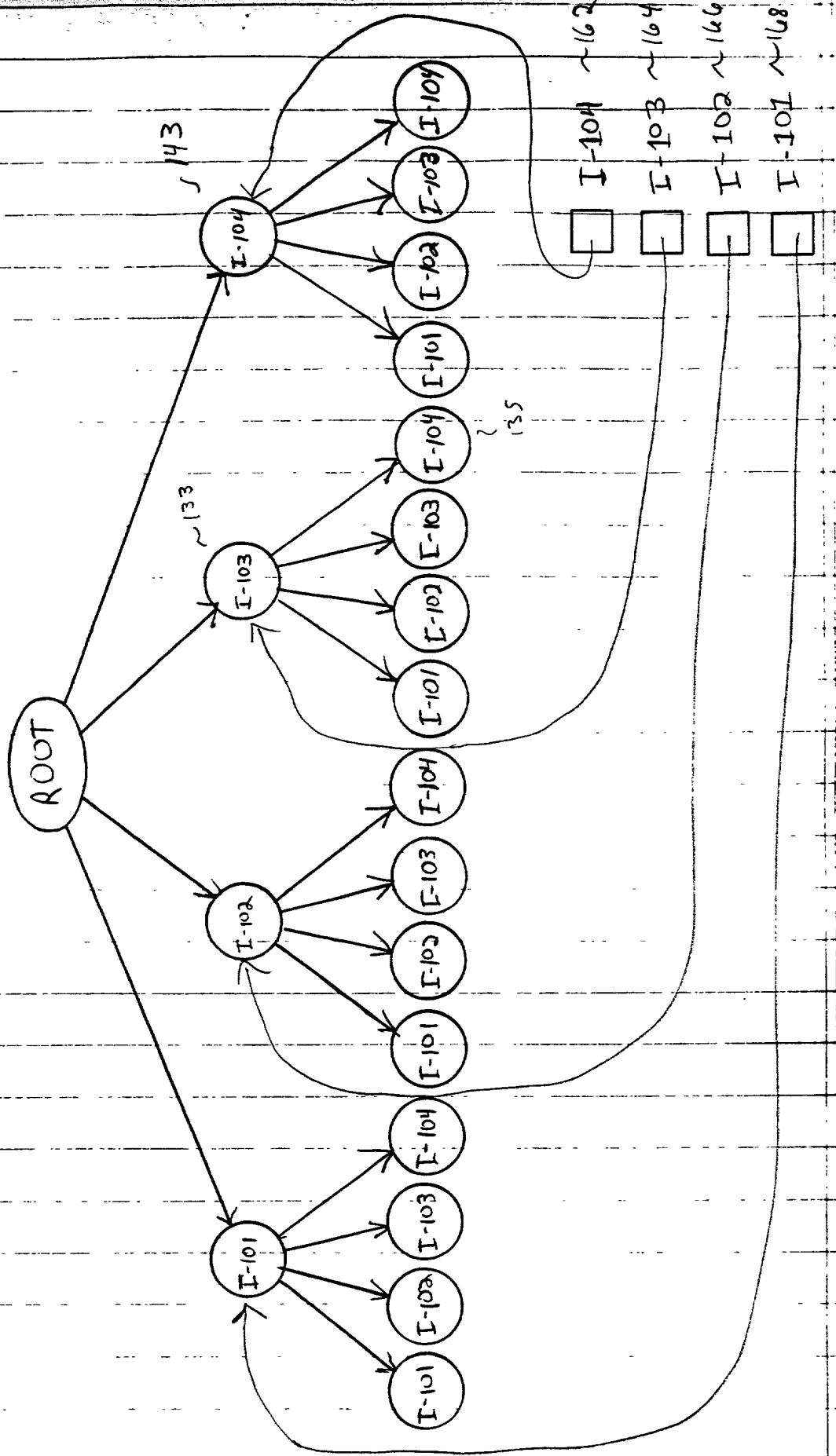


Fig. 1 m

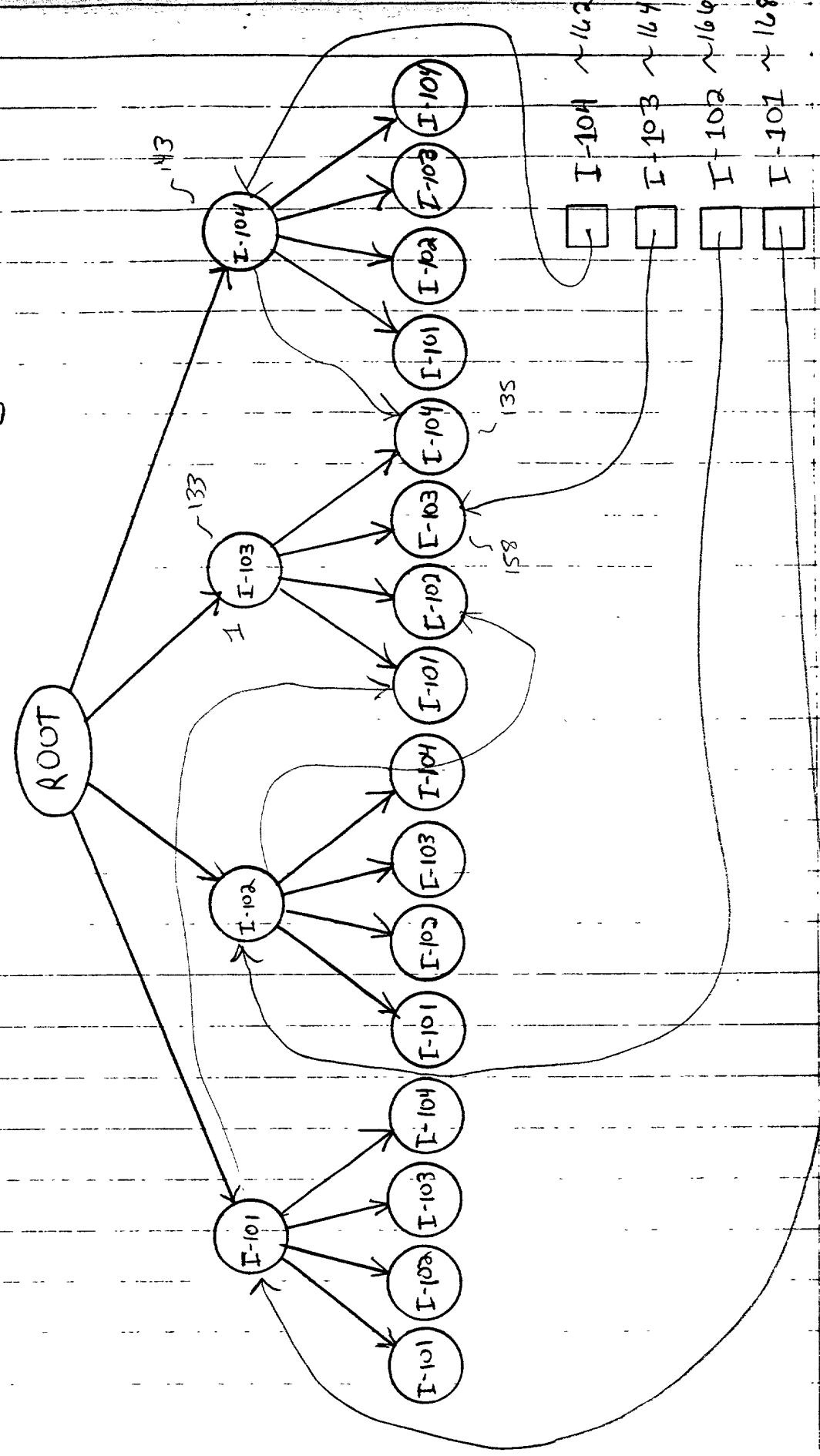
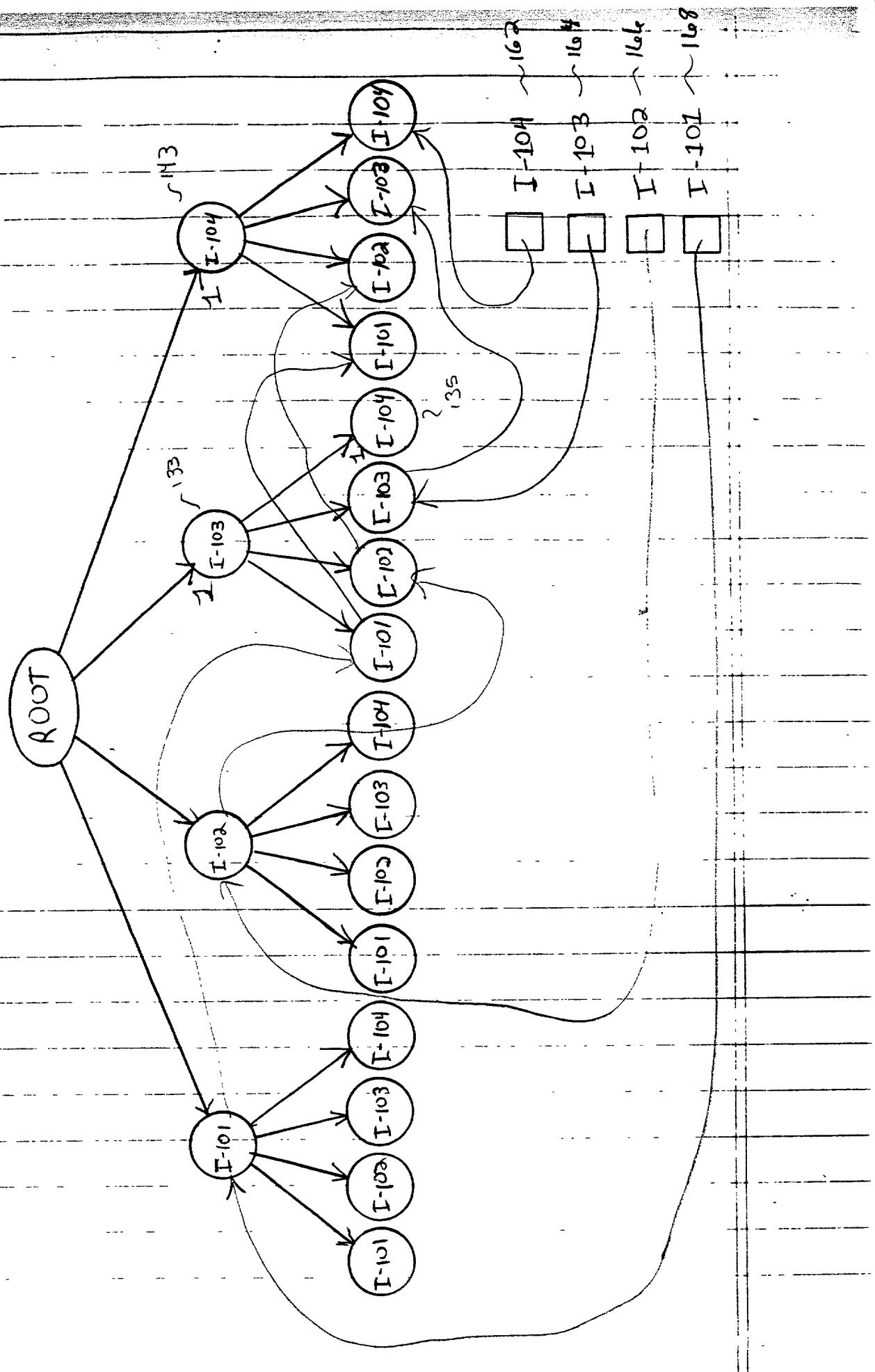


Fig. 1N



## Example Frequency Sequence Tree

### Node Data Structures

185	183	184	186	187
171	Node ID	I-104 143		
172	Node Parent ID	ROOT 130		
173	Node Children ID List	I-101 146, I-102 147, I-103 148, I-104 149		
174	Session Counter	4		
175	Sequence Length	1		
176	Last Sequence Element	I-104		
177	Token	Yes	No	Yes
178	Next Linked Node	-	-	-
179	User Counter	3	1	2
180	Number Of Original Intervening Elements	0	0	1
181	Cumulative Sequence Interval Time	0	1.0 units	3.7 units
				:

190	171	186	187
	Node ID	I-103 148	
	Node Parent ID	I-104 143	
	Node Children ID List	-	
	Session Counter	2	
	Sequence Length	2	
	Last Sequence Element	I-103	
	Token	No	Yes
	Next Linked Node	-	-
	User Counter	1	
	Number Of Original Intervening Elements	0	
	Cumulative Sequence Interval Time	1.0 units	
			:

191	171	186	187
	Node ID	I-103 148	
	Node Parent ID	I-104 143	
	Node Children ID List	-	
	Session Counter	2	
	Sequence Length	2	
	Last Sequence Element	I-103	
	Token	No	Yes
	Next Linked Node	-	-
	User Counter	1	
	Number Of Original Intervening Elements	0	
	Cumulative Sequence Interval Time	1.0 units	
			:

Figure 10

**Figure 1P**

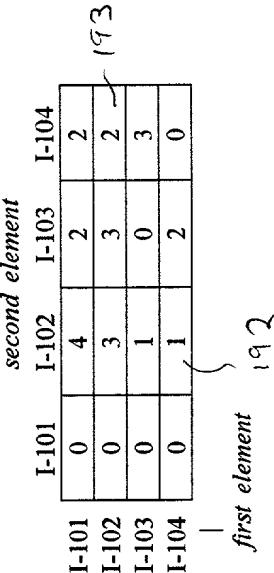
Example Frequent 2-Length Sequence Matrix

second element			
I-101	I-102	I-103	I-104
I-101	0	4	2
I-102	0	3	2
I-103	0	1	0
I-104	0	1	2

first element

192

194



Example User/Website Interaction Data (sorted by time)

User	Browsing Session	Interaction Event Identifier	Interaction Time	Interaction Event Category	Interaction Event Price
1	1	I-103	x+01.0	Book	High
5	2	I-101	x+02.0	CD	Low
1	1	I-104	x+02.4	Clothes	Medium
5	2	I-102	x+03.0	CD	Medium
5	2	I-103	x+04.6	Book	High
1	3	I-101	x+05.0	CD	Low
2	4	I-101	x+05.9	CD	Low
5	2	I-104	x+06.2	Clothes	Medium
1	3	I-102	x+06.5	CD	Medium
3	5	I-103	x+07.0	Book	High
2	4	I-102	x+07.1	CD	Medium
1	3	I-102	x+08.0	CD	Medium
3	5	I-104	x+08.2	Clothes	Medium
4	6	I-101	x+08.5	CD	Low
4	6	I-104	x+09.8	Clothes	Medium
2	4	I-102	x+10.0	CD	Medium
4	6	I-102	x+10.9	CD	Medium
3	7	I-102	x+11.2	CD	Medium
4	6	I-103	x+12.5	Book	High
3	7	I-104	x+13.0	Clothes	Medium
4	6	I-102	x+13.7	CD	Medium
3	7	I-103	x+14.0	Book	High
4	6	I-105	x+14.9	TV	Very High
5	2	I-106	x+15.5	Book	High
5	2	I-107	x+16.5	Clothes	Medium
			⋮		
5	2	I-149	x+18.6	Clothes	Medium
5	2	I-150	x+19.9	Clothes	Medium
			⋮		

**Figure 1S**

Fig. 109

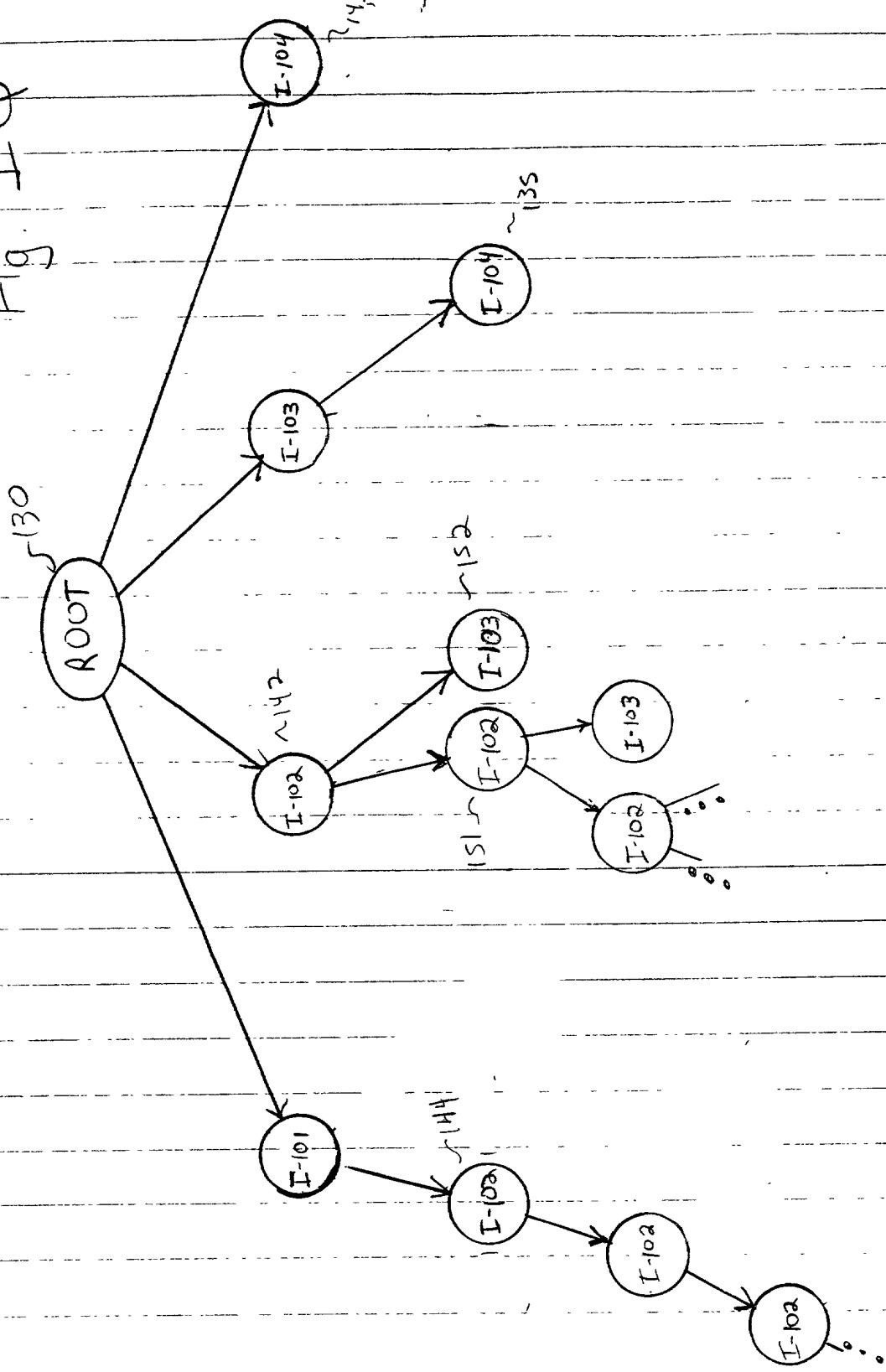


Fig. 1 R

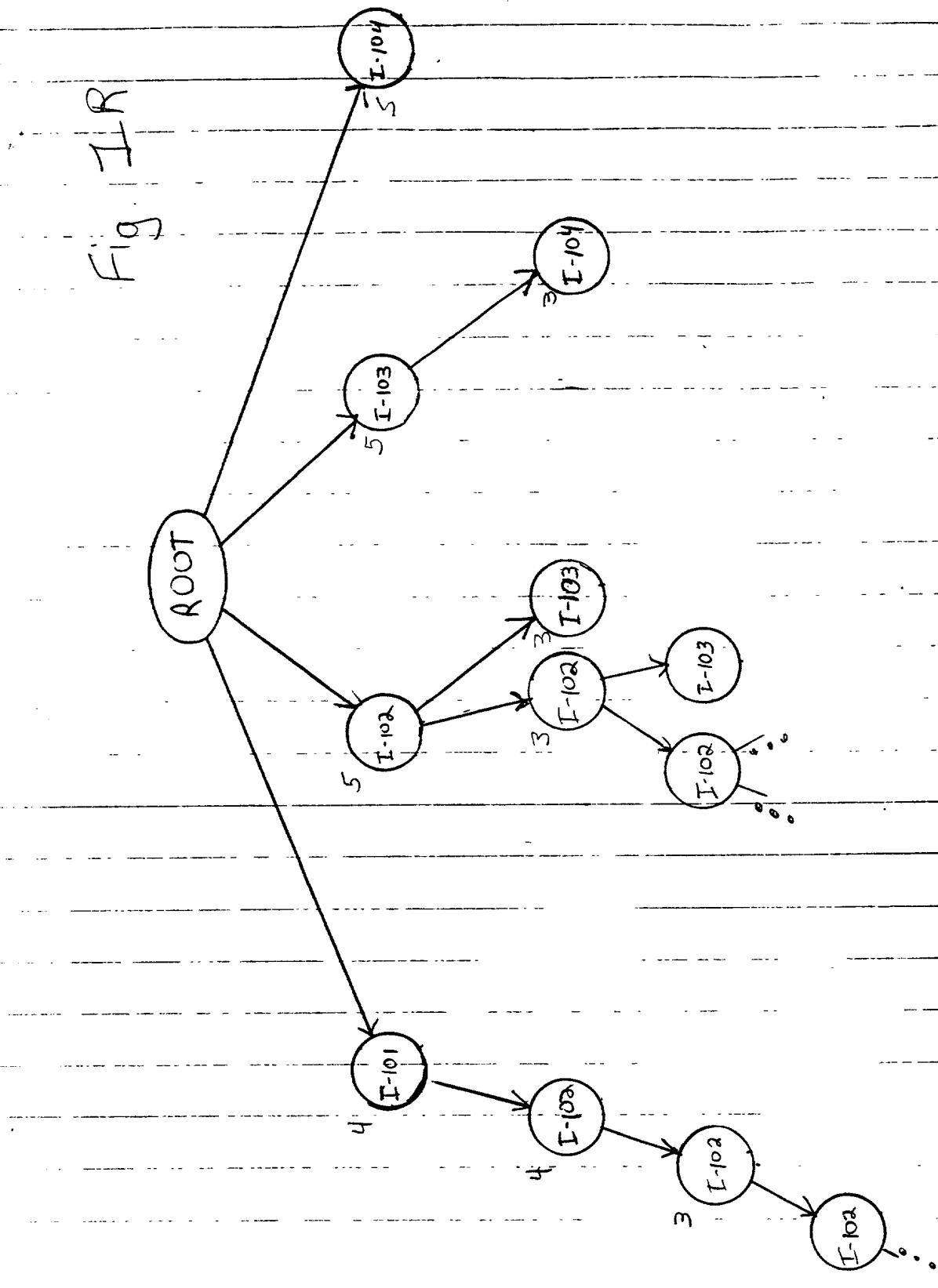


Fig. 1T

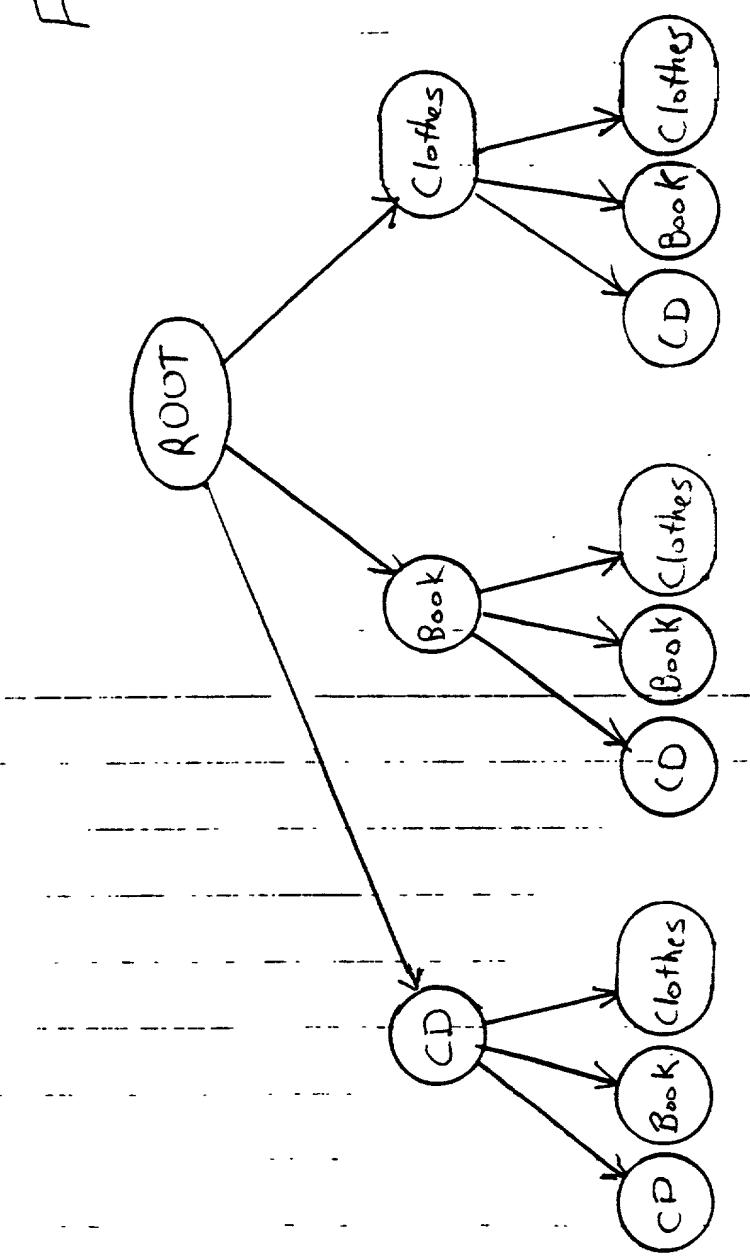


Fig. 1U

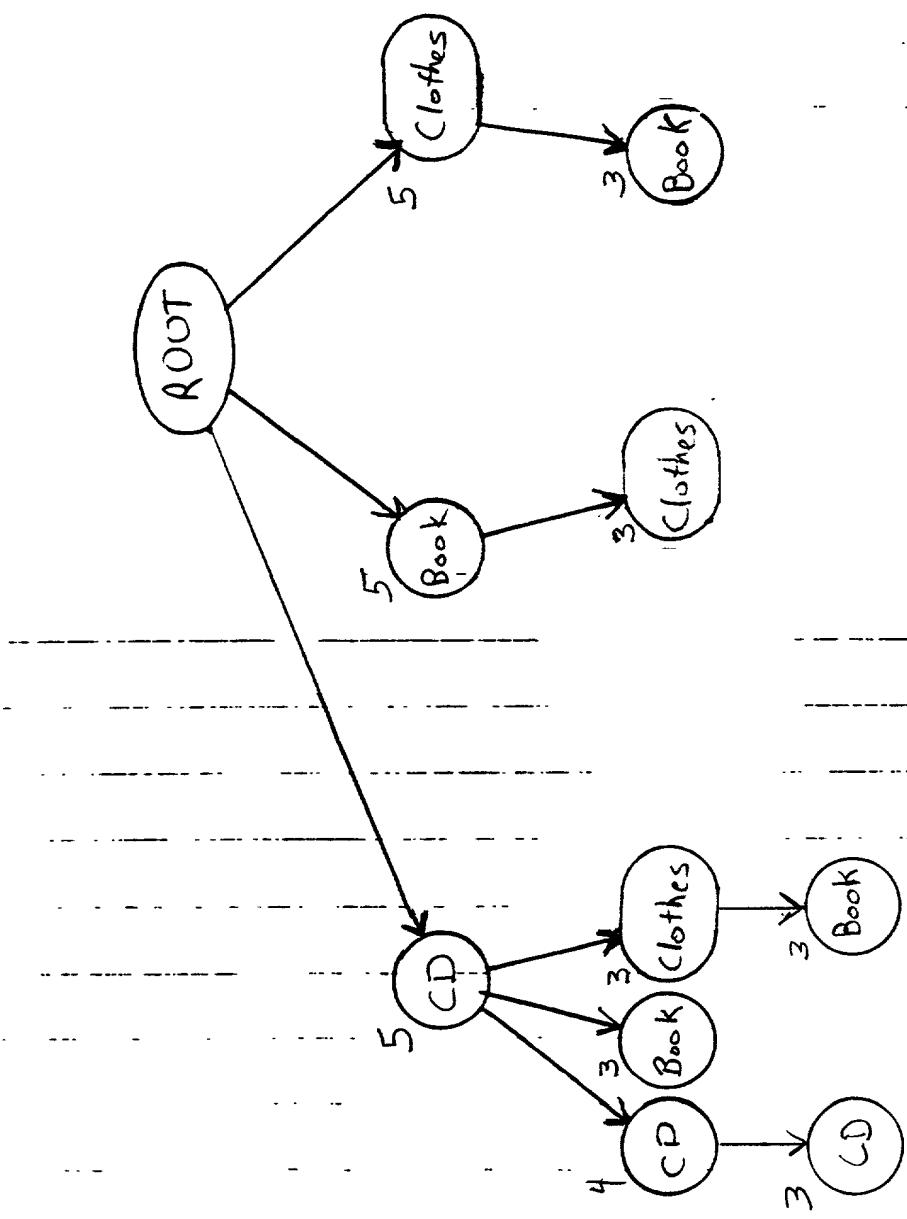


Fig. 1V

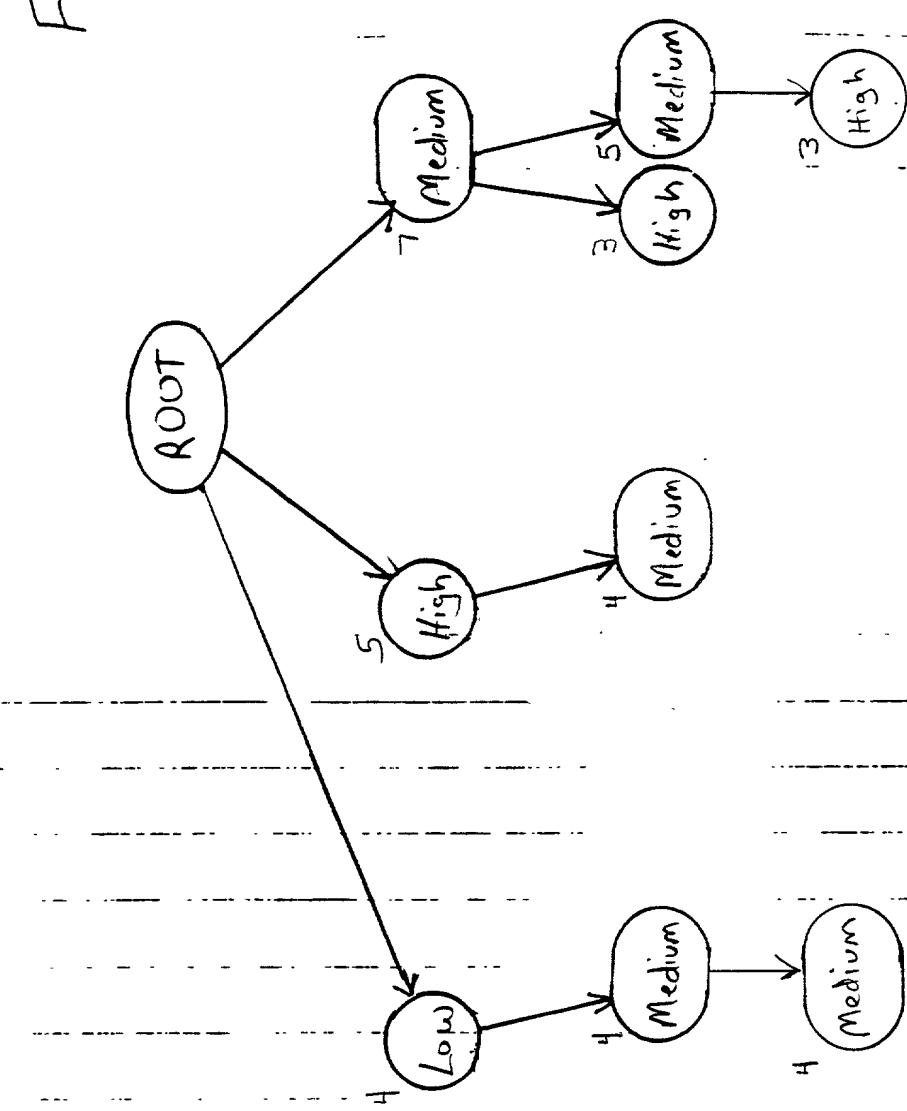


Fig. 1W

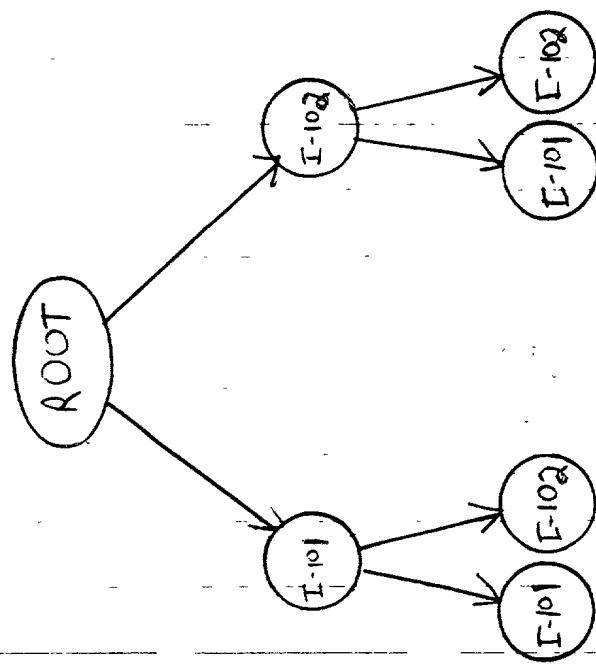
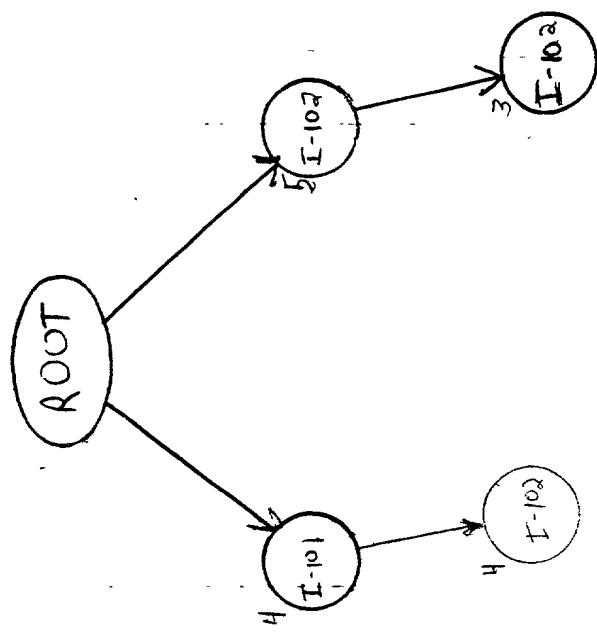


Fig. 1X



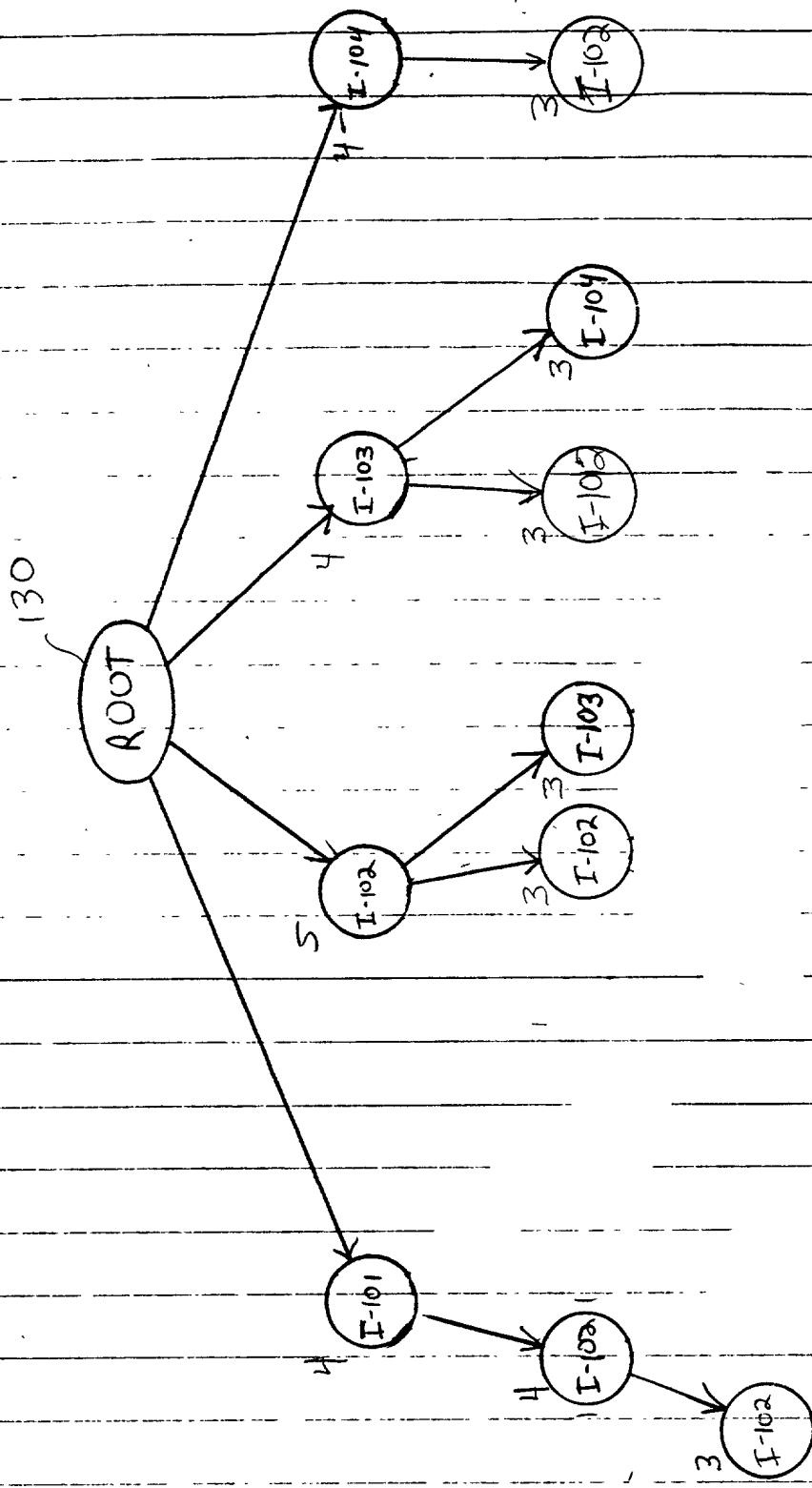


Fig. 1.Y

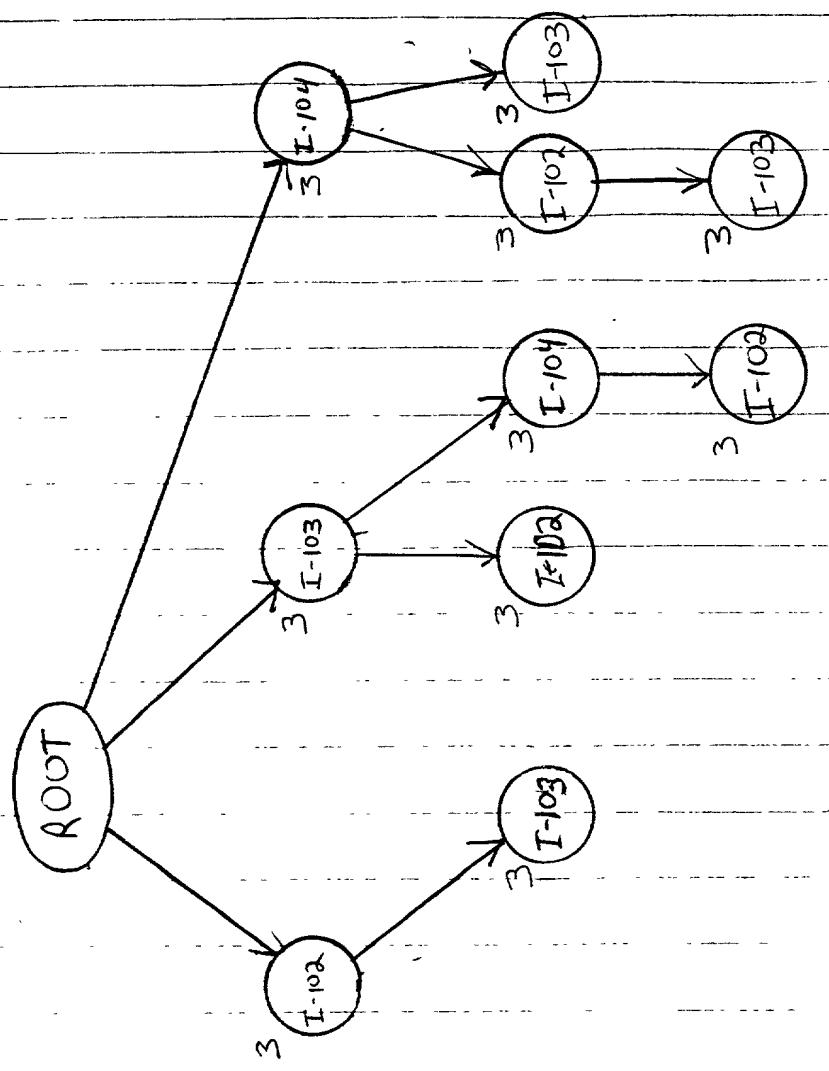
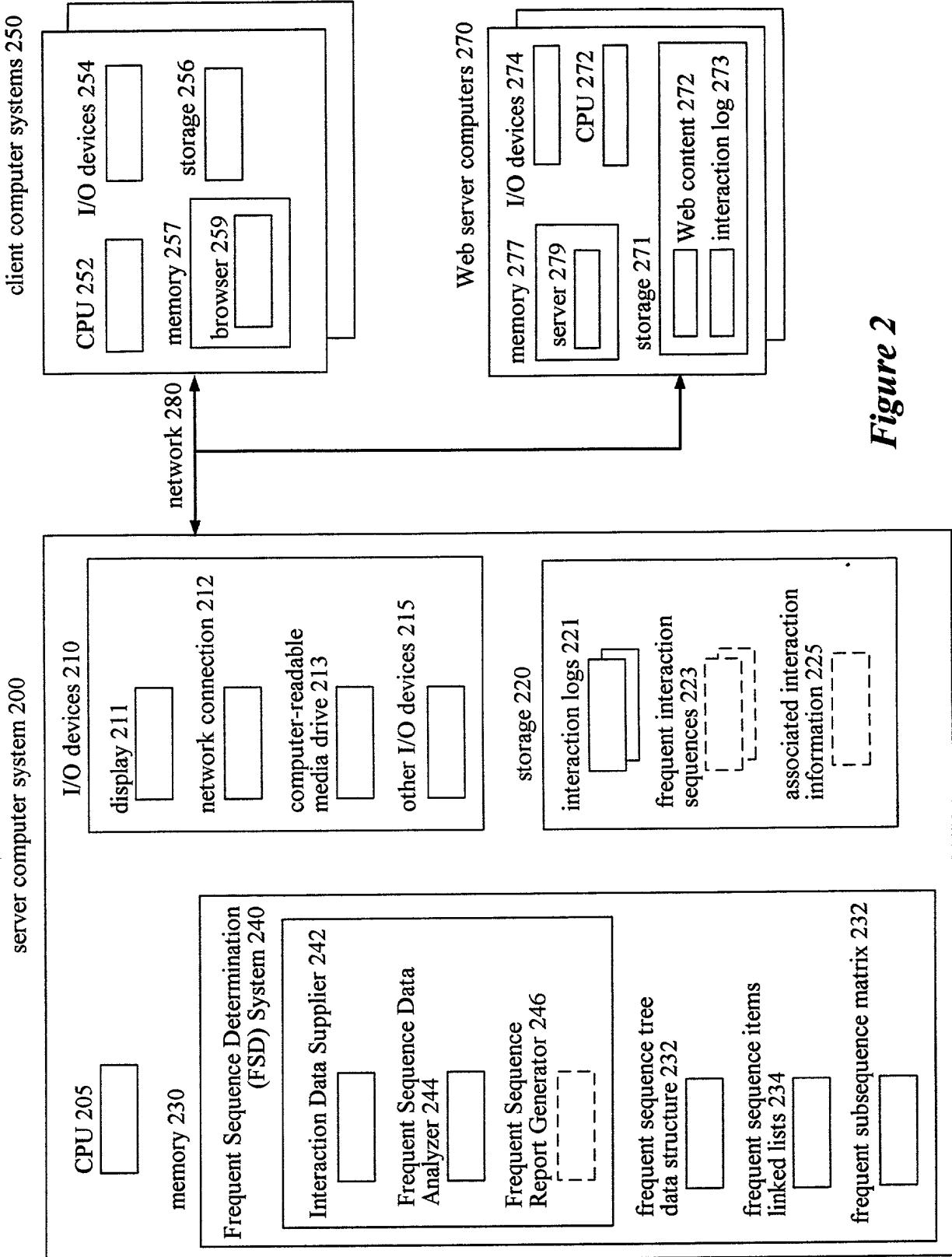


Figure 12



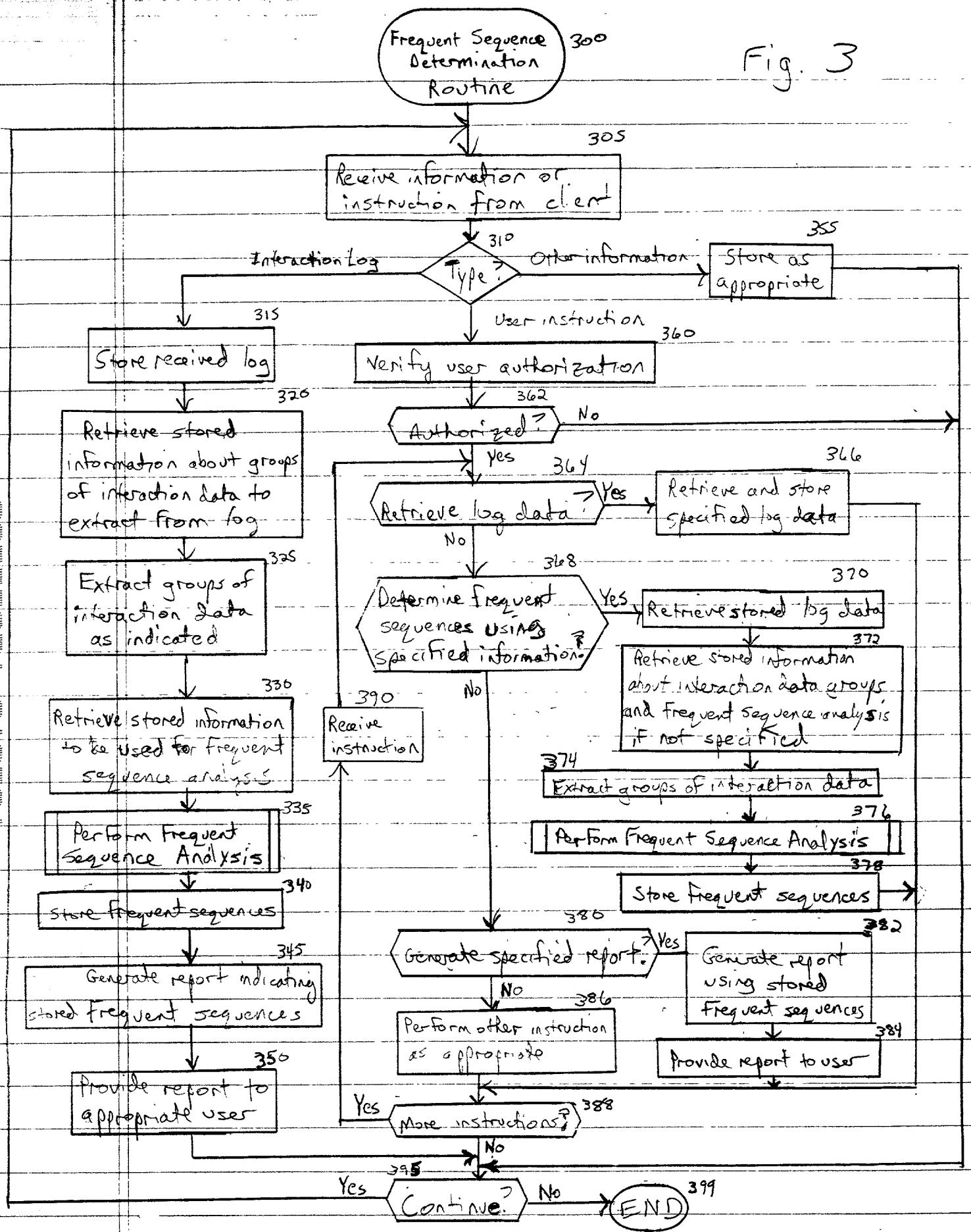
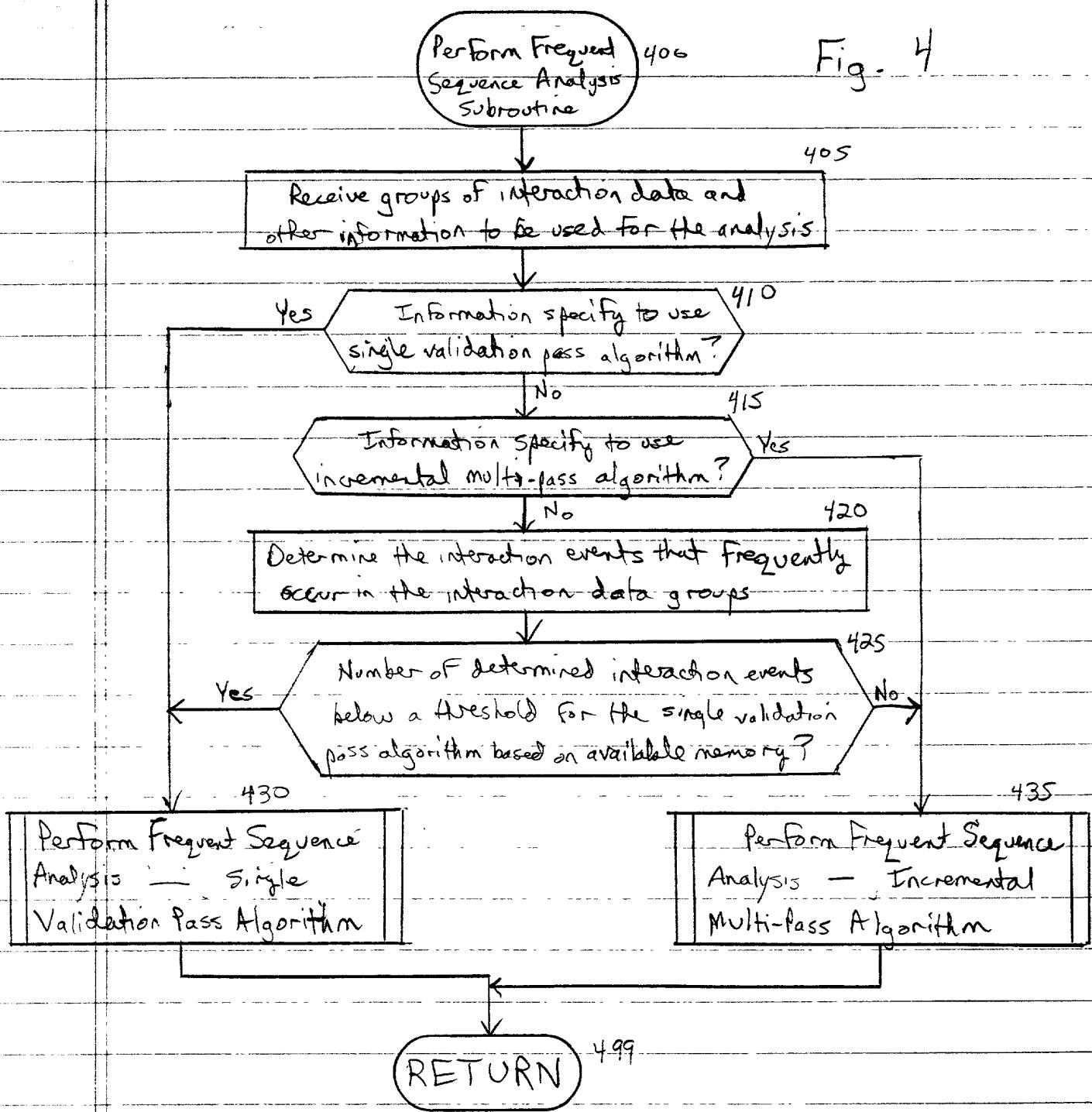


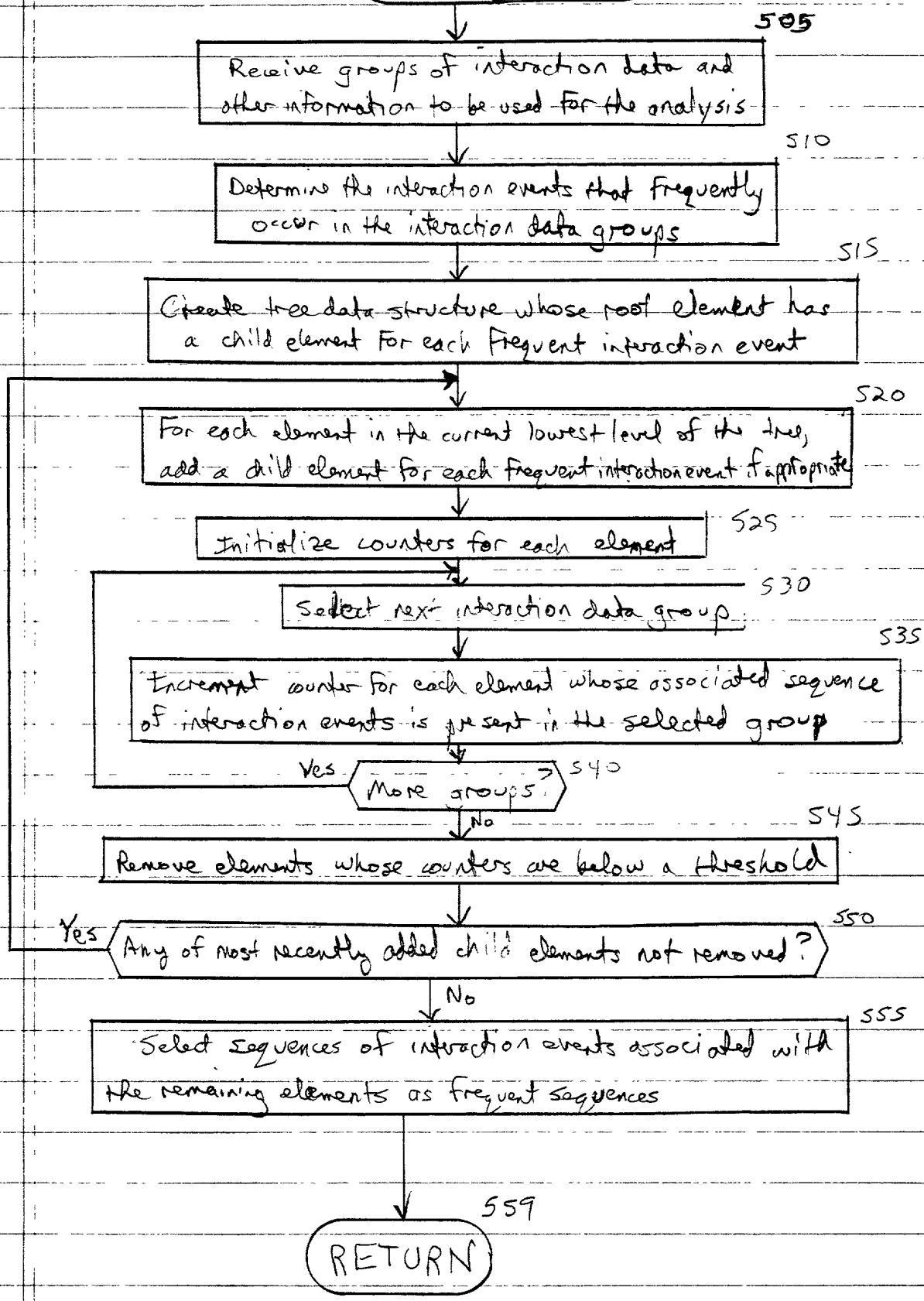
Fig. 3

Fig. 4



435  
Perform Frequent  
Sequence Analysis-Incremental  
Subroutine

Fig. 5A



Perform Frequent Sequence  
Analysis - Single-Pass  
Subroutine

430

Fig. 5B

560

Receive groups of interaction data and other  
information to be used for the analysis

563

Determine the interaction events that frequently occur  
in the interaction data groups

566

For each sequence of determined interaction events of  
a specified length, determine if the sequence is present  
in more of the interaction data groups than a threshold

568

Create a tree data structure where each element other than  
the root element represents one of the determined interaction  
events, and such that each hierarchical sequence of elements  
of the specified length represent a sequence of interaction  
events that was one of the determined sequences

Initialize counters for each element

570

Select next interaction data group

573

Increment counter for each element whose associated  
sequence of interaction events is present in the selected group

576

Yes   
 More groups.   
 No

578

580

Remove elements whose counters are below a threshold

585

Select sequences of interaction events associated  
with the remaining elements as frequent sequences

589

RETURN

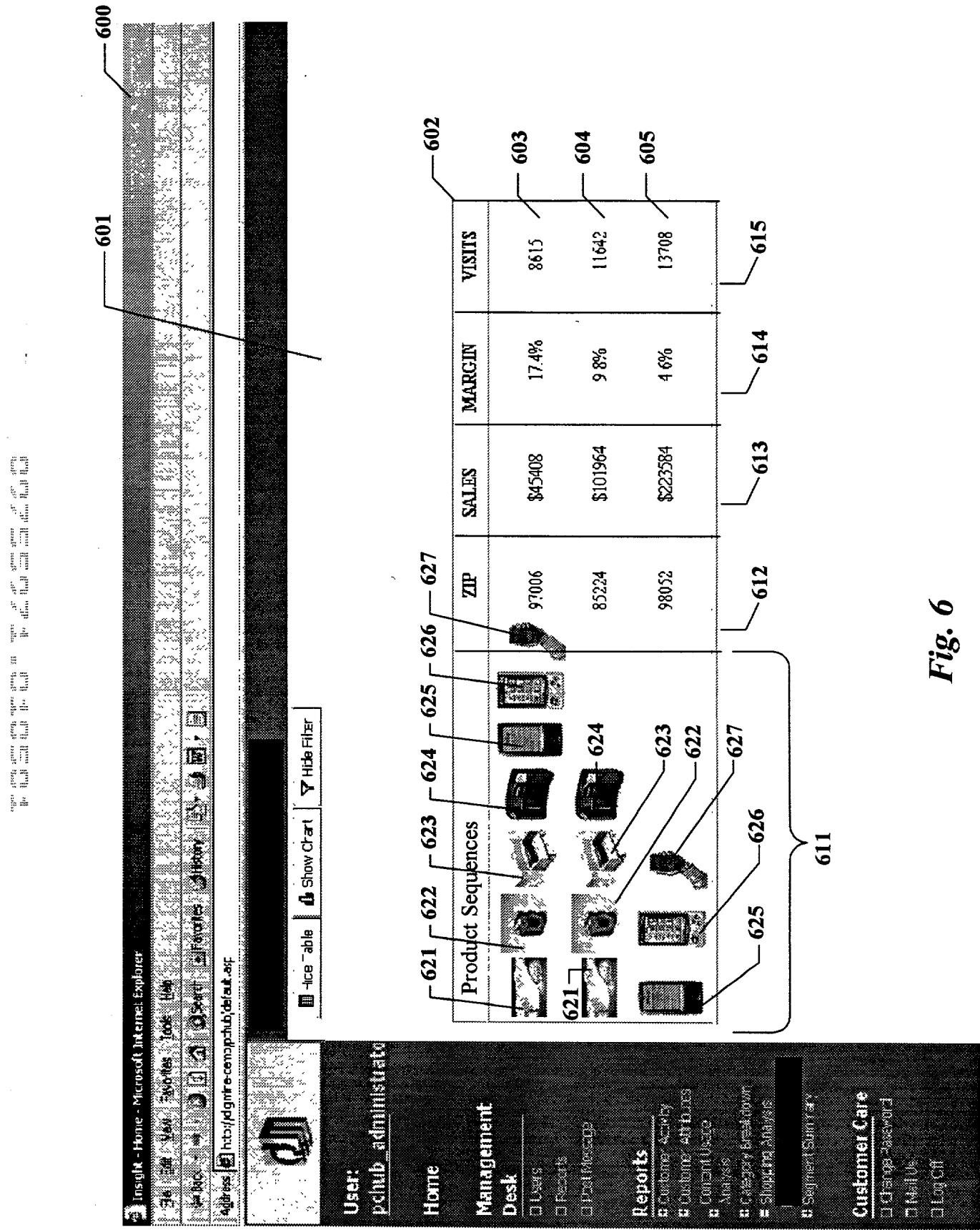


Fig. 6